

Vattenfall Wind Power

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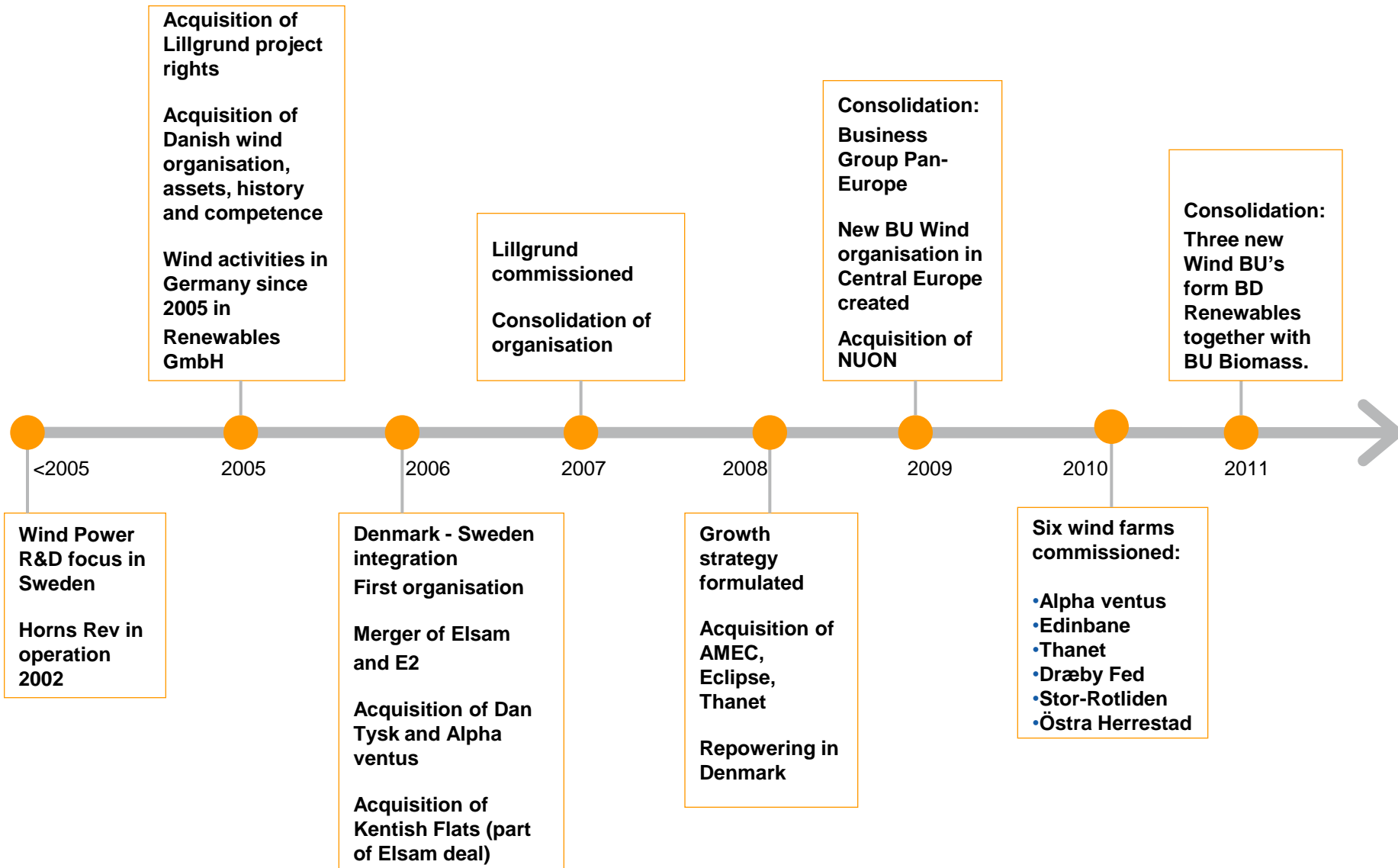
Confidentiality - None (C1)

Vision

Vattenfall will develop a sustainable and European energy portfolio with long-term, increasing returns and significant growth opportunities.

At the same time, Vattenfall will be one of the companies leading the development towards environmentally sustainable power production.

History of Vattenfall Wind Power



Wind Power – A cornerstone of Vattenfall energy mix



Vattenfall invests in wind power as one of the cornerstones for a better climate and for a profitable and sustainable development of Vattenfall today and in the future

- Wind power is the fastest growing source of renewable energy in Europe and has risen steadily over the last 15 years with annual average growth of 23%.
- Vattenfall sees significant growth opportunities in wind power.
- Vattenfall will continue to expand in offshore wind power in the North Sea countries – the UK, Germany and the Netherlands – and onshore in prioritised markets.

Wind Power – at Vattenfall

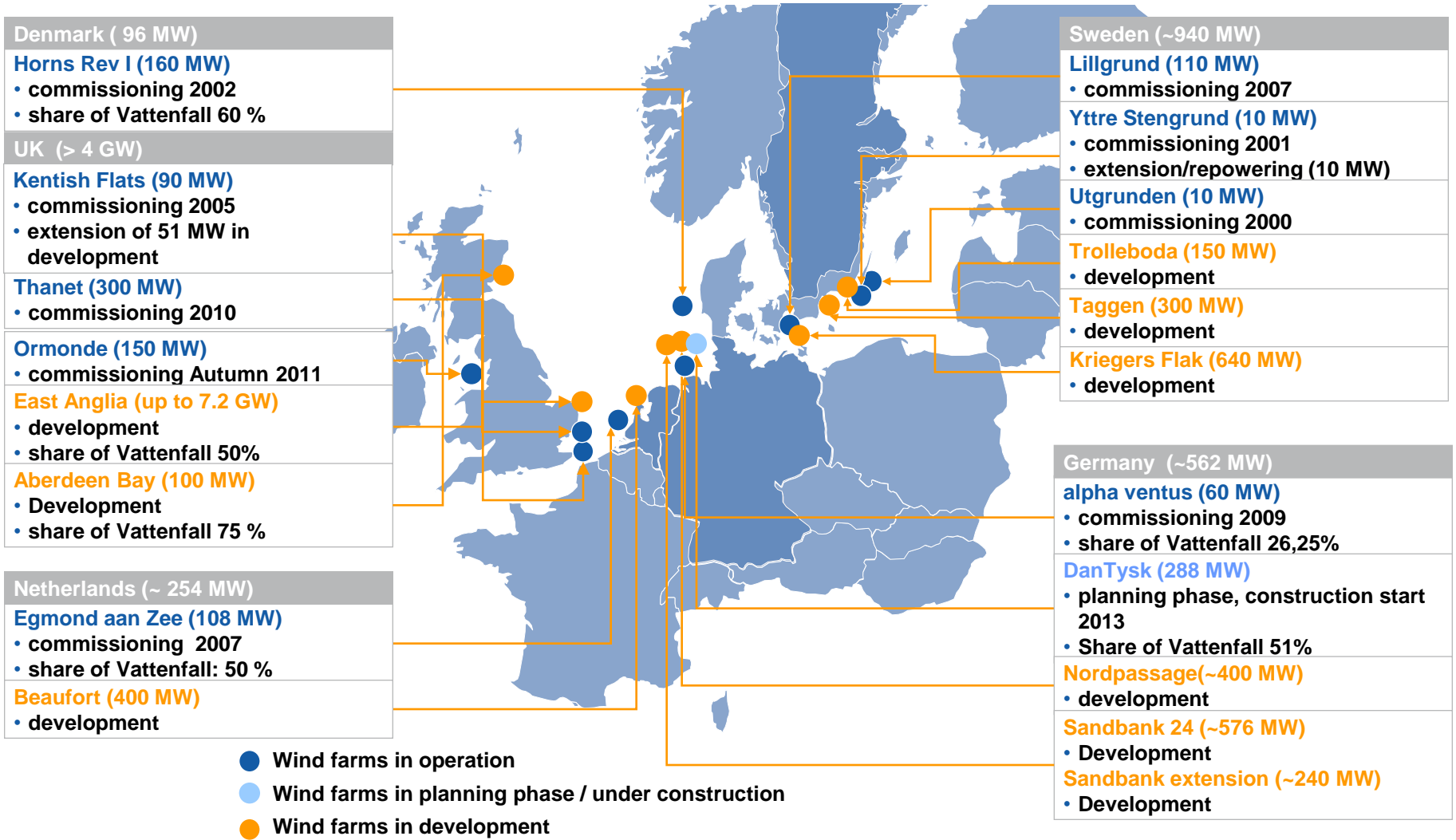
Vattenfall

- is one of the **leading European on- and offshore wind developers and operators**
- prioritizes on the development, construction and ownership of wind projects with the **highest potential and quality.**
- takes **responsibility** for people and environment before, during and after construction
- is committed to reach **high stakeholder acceptance** in the communities hosting our wind farms

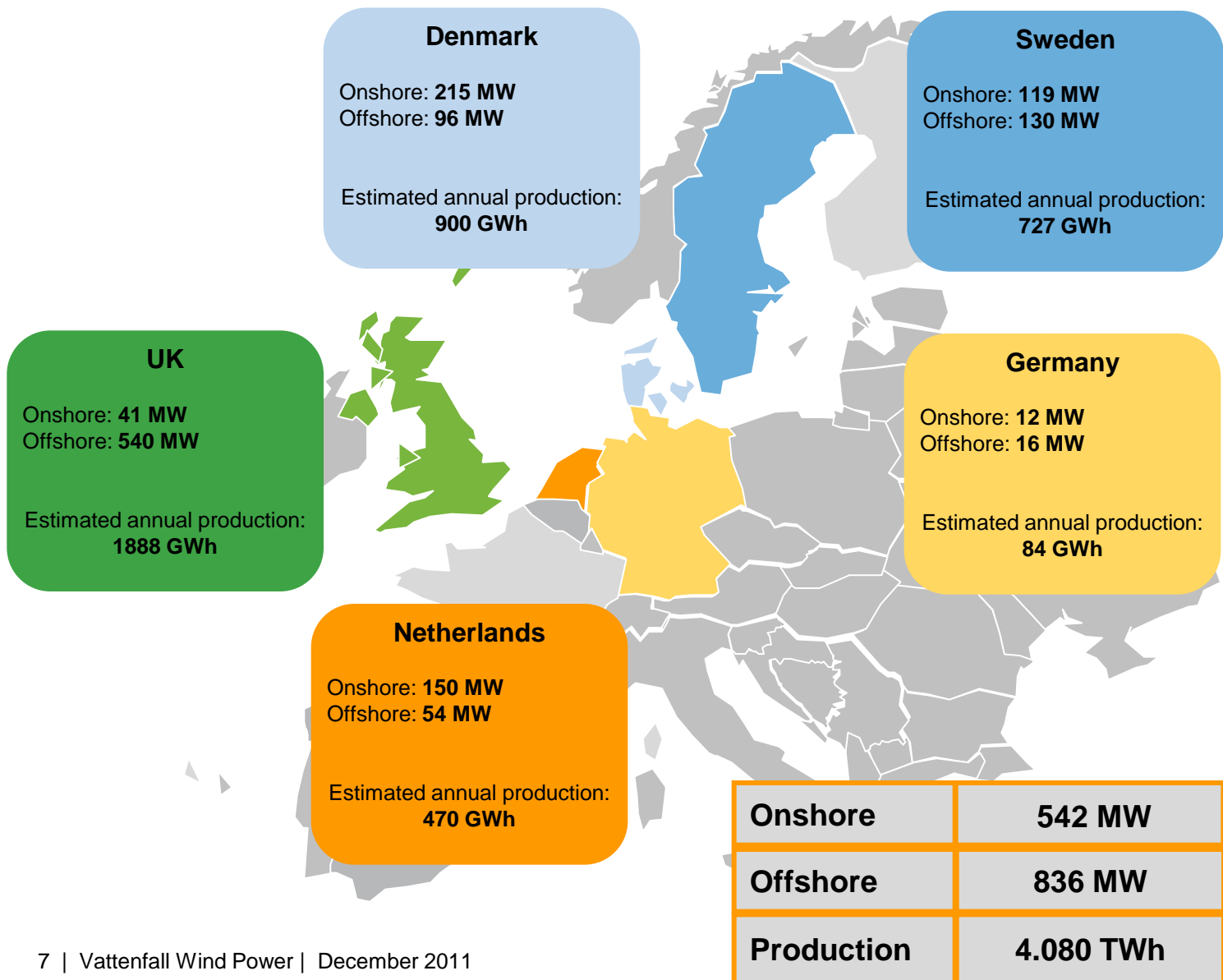


Vattenfall Offshore Wind Farm Portfolio

Today's total Vattenfall Offshore capacity in operation: 836MW

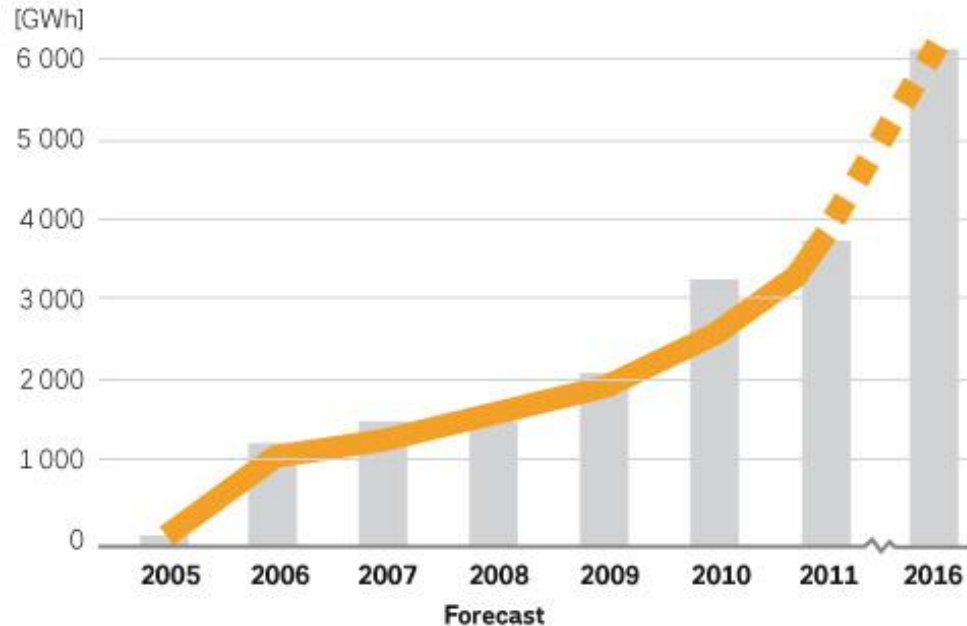


Wind Power – Vattenfall wind assets (as per November 2011)



Vattenfall's Wind Power Generation 2005-2016

Capacity increase 2005-2016



What once started as an R&D venture has rapidly evolved, and will continue to grow. Vattenfall is the second largest operator in offshore wind globally, and a growing player in onshore wind.

Offshore Projects the future – East Anglia Offshore Wind

East Anglia Offshore Wind (EAOW) is a joint venture between Scottish Power Renewables (SPR) and Vattenfall Wind Power Ltd.

SPR is part of Iberdrola, the world's largest renewable developer

Vattenfall Wind Power is part of the state owned Swedish energy utility Vattenfall AB. Europe's fifth largest generator of electricity and largest generator of heat.



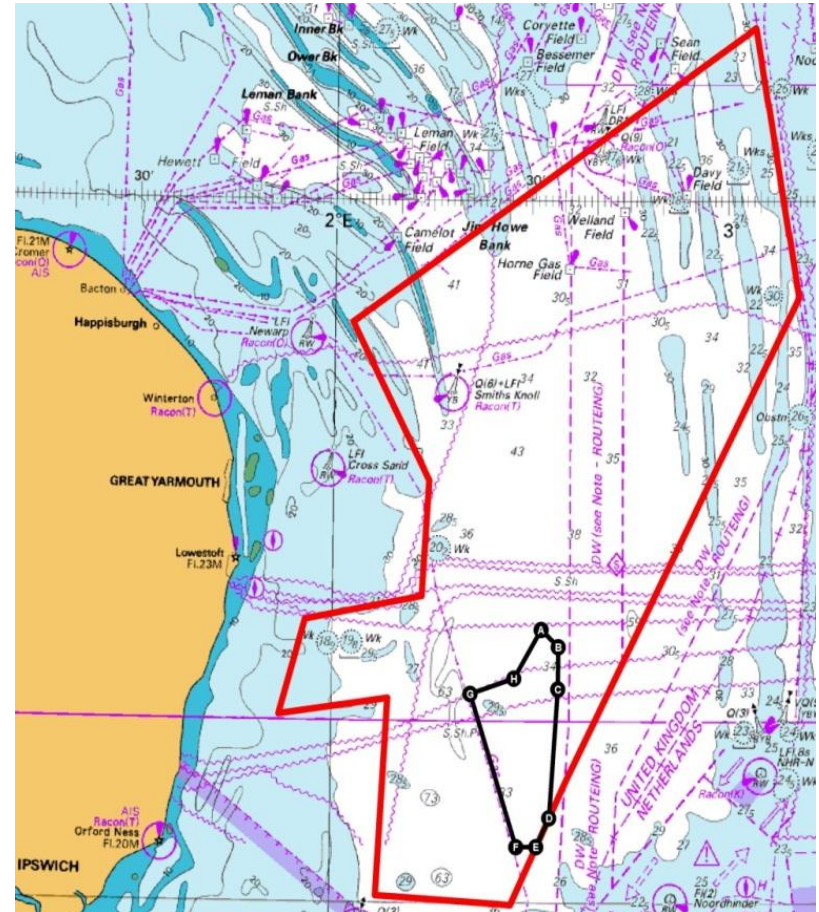
The Lillgrund Wind Power Plant 2008-04-13

Photo: Hans Blomberg +46 70 550 0121

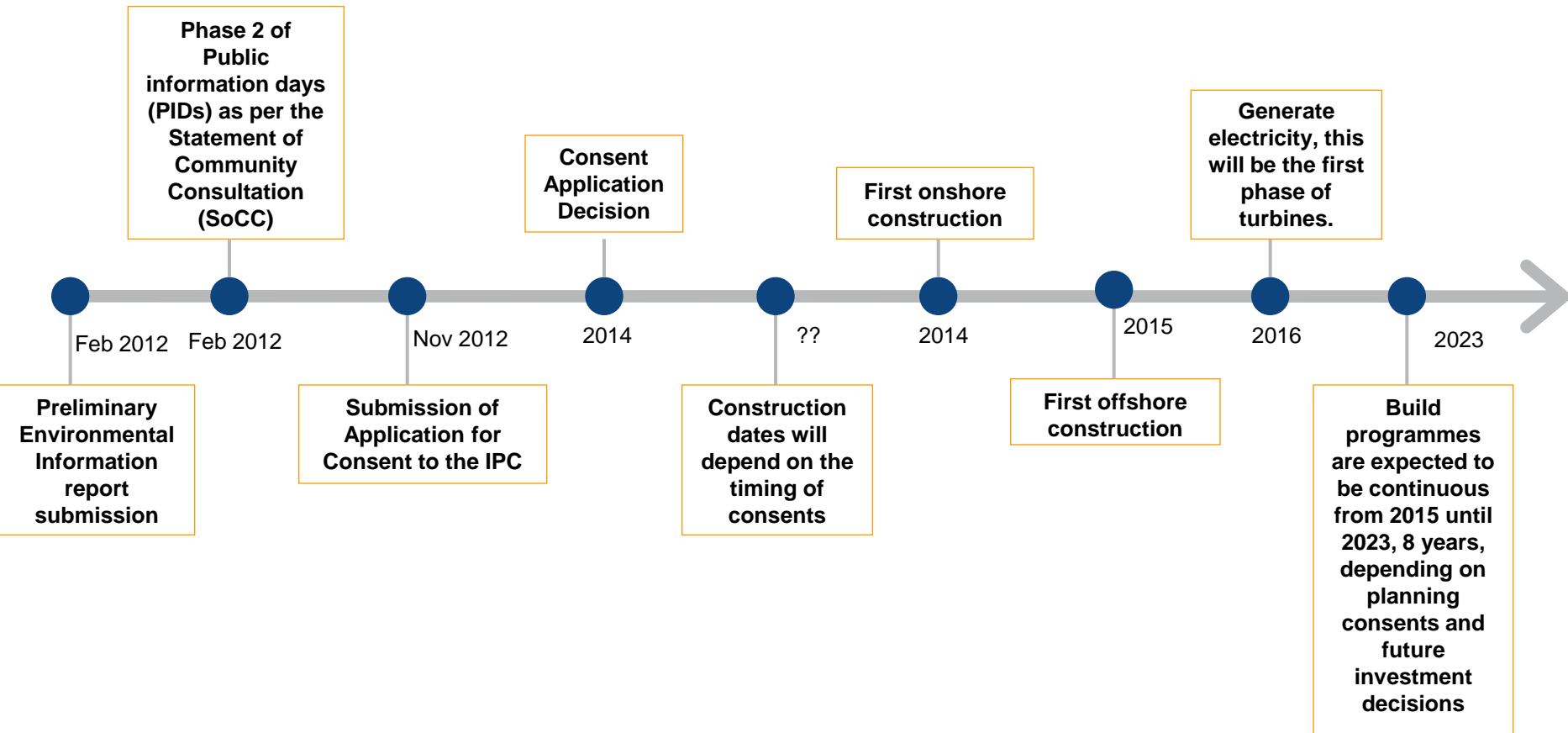
Location of East Anglia Project

FACTS

- Zone. Covers approximately 6000km² (1.5 x Suffolk!)
- Zone. 7.2 GW target capacity (Sizewell B is 1.2 GW)
- Zone. Clean energy for 5 million homes
- East Anglia ONE is 43km offshore (not visible from land)
- East Anglia ONE 1.2 GW (of the 7.2 GW)



East Anglia Offshore Wind Programme



KEY Success Factors

Experienced Suppliers

Experienced Project Team

A big challenge for the business is to bring down costs

- 10 years ago the unit price was 1.5m £ pr installed MW. Today it's between 3.0 and 4.0m.
- It's on the agenda everywhere, but is it possible to bring the costs down? = **YES**

We have to -

- Industrialisation of the business
- Standardisation
- Optimize our planning
- Lower supplier costs
- Lower the cost of produced energy
- Don't repeat others' mistakes – we will all suffer from that



Risks and Challenges

Massive expansion plans require massive capital from investors.

Investors like high IRR's and low risk

How do you combine this ?

- 1. Overcome technical challenges**
 - Foundations low risk
 - Turbines low risk
 - Cables high risk
- 2. Lower the OPEX**
 - **Design**
 - **More reliable turbines**
- 3. Lower the CAPEX**
 - Design
 - Lower the scope of work
 - Lower the supplier costs
- 4. Lower the Levelised Energy Cost**
 - **More effective wind turbines**
- 5. Lower subsidy dependency**

Construction ON and OFF shore

- Further offshore lead to think alternative
- Keep it simple – easy installation
- Construct onshore and install offshore
- Assembly of turbines onshore
- Pre-commissioning of turbines onshore
- Alternative cable installation methods
- Construction islands
- Cable installation – jetting and ploughing on deep water



LOOKING FORWARD

FOCUS AREAS

- Experienced suppliers
- Experienced teams
- Planning
- Minimize time offshore
- Flexibility
- Less weather sensitive vessels
- Project lowering of LEC Costs

